

Bovine Tuberculosis

Tuberculosis (TB) is a contagious disease of both animals and humans. It is caused by three specific types of bacteria that are part of the *Mycobacterium* group: *Mycobacterium bovis*, *M. avium*, and *M. tuberculosis*.

Bovine TB, caused by *M. bovis*, can be transmitted from livestock to humans and other animals. No other TB organism has as great a host range as bovine TB, which can infect all warmblooded vertebrates. *M. avium* can affect all species of birds, as well as hogs and cattle. *M. tuberculosis* primarily affects humans but can also be transmitted to hogs, cattle, and dogs.

Bovine TB has affected animal and human health since antiquity. Once the most prevalent infectious disease of cattle and swine in the United States, bovine TB caused more losses among U.S. farm animals in the early part of this century than all other infectious diseases combined. Begun in 1917, the Cooperative State–Federal Tuberculosis Eradication Program, which is administered by the U.S. Department of Agriculture's (USDA) Animal and Plant Health Inspection Service (APHIS), State animal health agencies, and U.S. livestock producers, has nearly eradicated bovine TB from the Nation's livestock population. This disease's presence in humans has been reduced as a result of the eradication program, advances in sanitation and hygiene, the discovery of effective drugs, and pasteurization of milk.

The Disease

In general, disease-causing mycobacteria live only a few weeks outside a host's body because they cannot tolerate prolonged exposure to heat, direct sunlight, or dry conditions. Under cold, dark, and moist conditions, the organisms can survive longer.

Mycobacteria do not grow outside of a host except in cultured media, where they multiply approximately once every 20 hours. Because of this relatively slow rate of growth, the disease usually takes many months to develop. In some instances, the organisms lie dormant within the host's body for its lifetime, both in animals and in humans, without causing progressive disease.

Bovine TB is a chronic disease, seldom becoming apparent until it has reached an advanced stage in cattle, captive cervids, and swine. Some infected livestock seem to be in prime condition, showing no

evidence of infection until they are slaughtered, yet they may be found so seriously infected during slaughter inspection that their carcasses must be condemned.

TB Transmission

Bovine TB can be transmitted from animals to humans and vice versa. Although young animals and humans can contract the disease by drinking raw milk from infected dams, the most common means of transmission is through respiration. Invisible droplets (aerosols) containing TB bacteria may be exhaled or coughed out by infected animals and then inhaled by susceptible animals or humans. The risk of exposure is greatest in enclosed areas, such as barns. Inhalation of aerosols is the most common route of infection for farm and ranch workers and veterinarians who work with diseased livestock. Livestock also are more likely to infect each other when they share a common watering place contaminated with saliva and other discharges from infected animals. Calves, hogs, and humans can contract bovine TB when they drink unpasteurized milk from infected cows.

Diagnosis

TB lesions may be found in any organ or body cavity of diseased animals. In early stages of the disease, these lesions are difficult to find, even during post mortem examination. But in later stages, the nodules or lumps caused by bovine TB become very evident in the lungs and associated lymph nodes and in the lymph nodes of the head and intestinal tract. Lesions may also appear in the abdominal organs, reproductive organs, nervous system, superficial body lymph nodes, and bones.

Humans and animals with TB develop an immune response, which can be detected by the tuberculin skin test. Tuberculin is a sterile laboratory product made by growing TB bacteria, killing them with heat, removing them from the substance on which they were grown, and properly diluting and preserving the remaining mixture. About 72 hours after tuberculin is injected into animals affected with TB, a characteristic swelling reaction appears at the point of injection. This reaction is a positive test result, indicating exposure to one type of mycobacteria.

Further diagnostic methods are necessary to confirm the presence of bovine TB. In humans, these tests include chest x rays and sputum cultures. For animals, the comparative cervical tuberculin test, serological tests, post mortem examinations, and other laboratory procedures are used.

The course of treatment for humans with bovine TB takes 6 to 9 months, and the success rate following treatment is more than 95 percent. In livestock, bovine TB can be controlled within an affected herd through regular testing and slaughter of any single animal that tests positive until the entire herd tests negative for this disease. However, because there is no method available to ensure that bovine TB has been eliminated from an affected herd, APHIS recommends herd depopulation.

Control and Eradication

The most effective way of handling the problem of bovine TB in humans is to eradicate it in livestock. At the start of the cooperative eradication program at the beginning of this century, all cattle herds were systematically tested, and all reactors were sent to slaughter. Federal and State agencies shared in the payment of indemnities. Premises were cleaned and disinfected after infected cattle were removed. As a result of this program, the reactor rate in cattle was reduced from about 5 percent to currently less than 0.02 percent. Consequently, the incidence of human TB caused by *M. bovis* also decreased significantly. The resurgence of human TB in recent years is attributable to *M. tuberculosis*.

Today, with a very low rate of bovine TB, the most efficient way of finding the disease is through a nationwide surveillance program in slaughter plants. State or Federal meat inspectors check the glands and organs of cattle for signs of TB. If these inspectors find lesions indicative of TB infection, tissue samples are sent to APHIS' National Veterinary Services Laboratories in Ames, IA, for confirmation. If the laboratory confirms that the lesions are the result of bovine TB, an exhaustive attempt is made to trace the infected livestock back through market channels to the originating herd, which is then tuberculin tested.

If the herd of origin is diagnosed with *M. bovis*, every effort is made to eliminate all animals in the herd. Indemnities, as available, are paid to help compensate owners for their losses. If the herd cannot be depopulated, it is held under quarantine and tested repeatedly until all evidence of infection is eliminated.

Veterinary epidemiologists also attempt to determine the date the herd was probably infected. They then undertake a concerted effort to trace all cattle that moved into or out of the affected herd to try to find out where the disease came from and where it might have gone.

Area Accreditation

For a State to be accredited free of bovine TB, there must have been no confirmed cases of the disease for at least 5 years, and the State must have a set of stringent laws and regulations governing live-

stock dealers. The State must also maintain surveillance of cattle in marketing channels and require that records be kept that would allow animal health officials to trace infected animals back to their source.

Herd Accreditation

Livestock owners may achieve accredited TB status for their individual herds by following the "Accredited Herd Plan." Details can be found in the publications, "Bovine Tuberculosis Eradication, Uniform Methods and Rules" (UM&R) and "Tuberculosis Eradication in Cervidae, UM&R."

For a herd to qualify as accredited, a negative finding on two annual TB tests must be attained for all cattle over 24 months of age and cattle of any age that are not natural additions to the herd. Deer and elk herds must test negative for 3 consecutive years. To qualify and continue as an accredited herd, livestock must be tested annually within 10 to 14 months of the anniversary of the original test. Livestock from any herd in an accredited free State may be added to an accredited herd without a qualifying test.

What You Can Do

As a livestock producer—dairy, beef, deer, or elk—there are certain things you can do to protect your animals from TB.

The first and most important is to be aware that TB is not gone! Too many farmers falsely believe that TB in cattle has already been eradicated. Remember that this chronic disease will continue to be a threat to animal health until the last infected animal has been eliminated.

So, to be safe, have your livestock tested for TB by an accredited veterinarian to make sure the disease isn't present in your herd. Other tips for preventing TB infection are as follows:

- One of the best ways to avoid TB—and other diseases, too—is to keep a closed herd. Doing so involves raising your own replacement stock. If this system isn't practical for you, demand that sellers give you historical health information about the herd of origin. It's best to buy from accredited TB-free herds.
- If you cannot obtain health histories, make sure any prospective livestock are tested before purchase. Isolate these animals and have them retested 60 days later by an accredited veterinarian.
- Maintain fences in good repair to keep your animals from mingling with neighboring animals.
- And, finally, cooperate with State and Federal animal health officials who are carrying out traceback investigations.

